

Using Conceptual Models in Adaptive Management

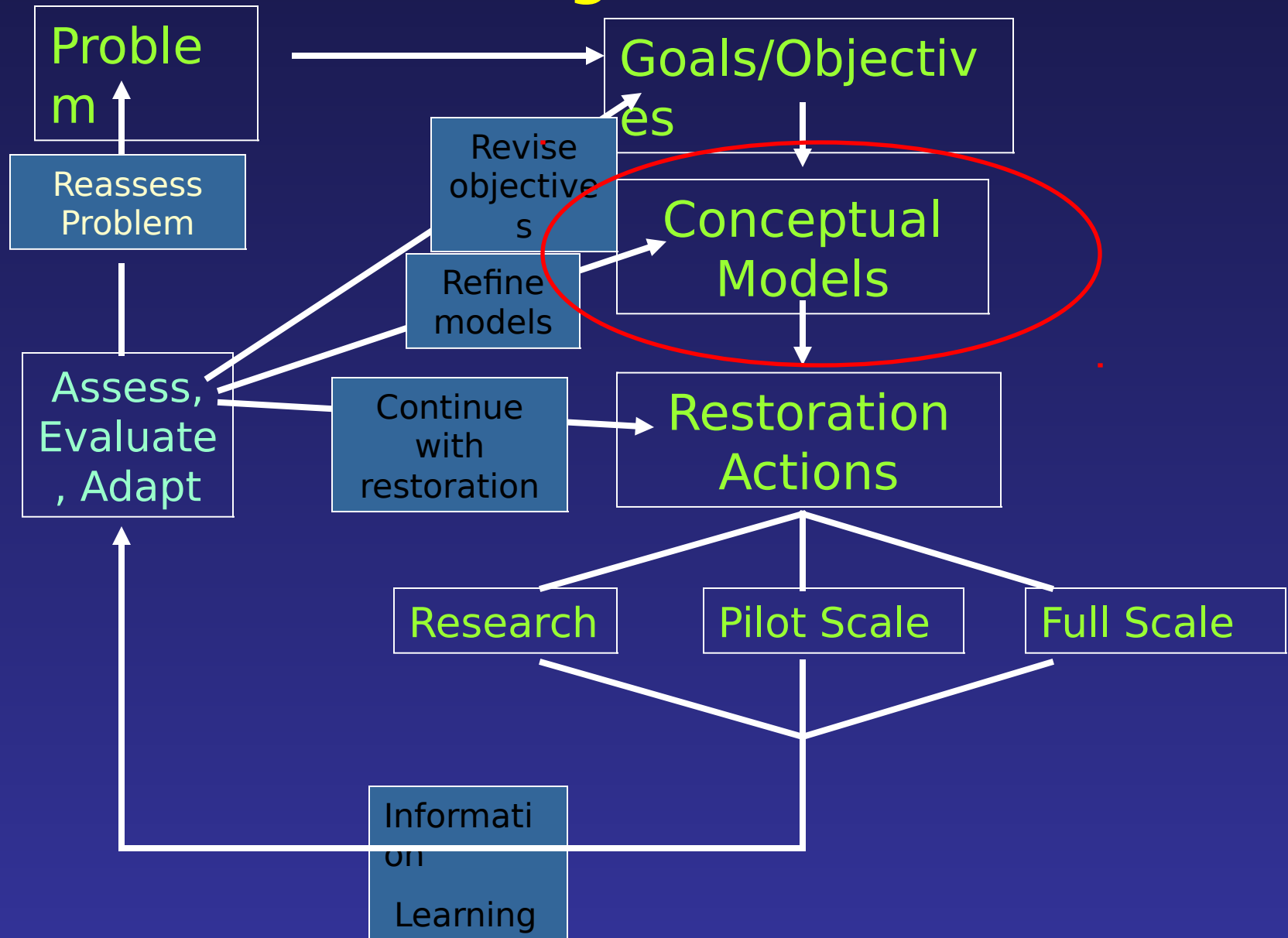
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Conceptual Models

- How do they fit into Adaptive Management
- The CALFED approach
- Example models
- Using them in Decision Making
- Observations on USACE process

Thanks to CALFED colleagues especially ERP Science Board, DRERIP Adaptive Management Planning Team, Lauren Hastings, Bruce DiGennaro, Stuart Siegel

CALFED Strategic Plan Adaptive Management



DLO Approach

- **Drivers**

- Physical
- Biological
- Anthropogenic

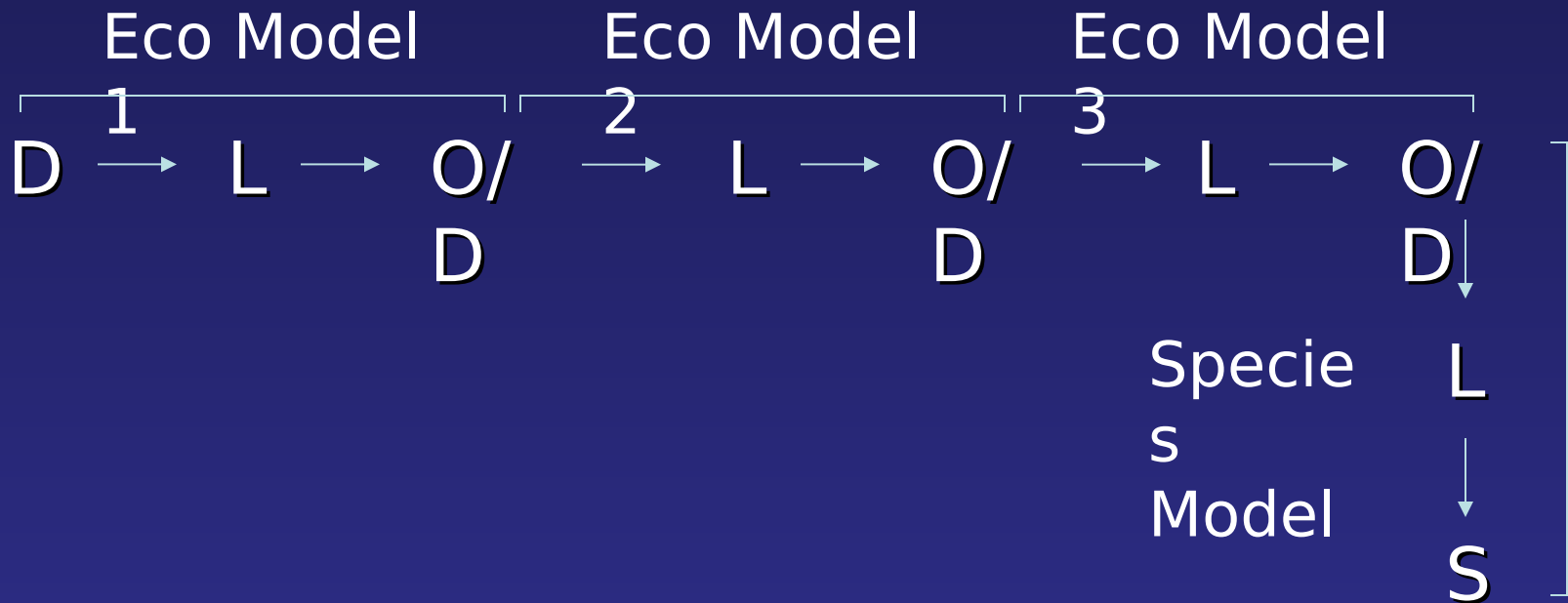
- **Linkages (cause & effect)**

- Nature & direction
- Importance
- Certainty

- **Outcomes**

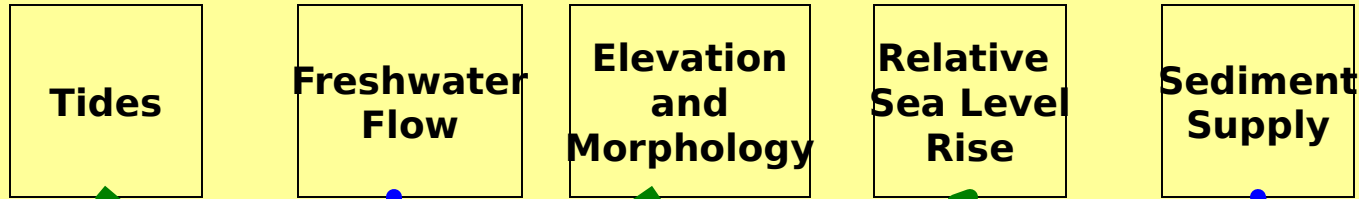
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DLO Approach

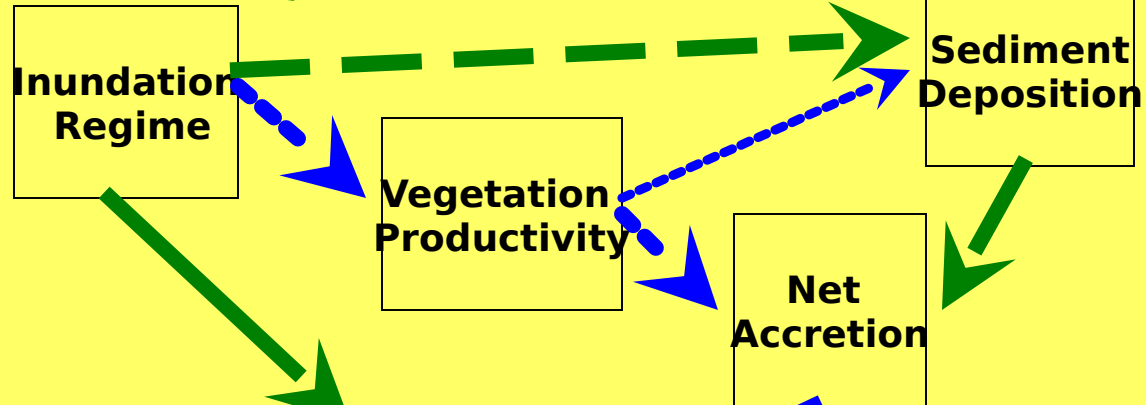


Model 1: Initiating Controls

Drivers



Intermediate Outcomes



Outcomes



Importance:



High - thick line



Med - medium line



Low - thin line

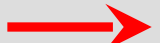
Understanding:



High - green arrow



Med - blue arrow

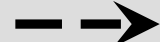


Low - red arrow

Predictability:



High - solid line



Med - dashed line



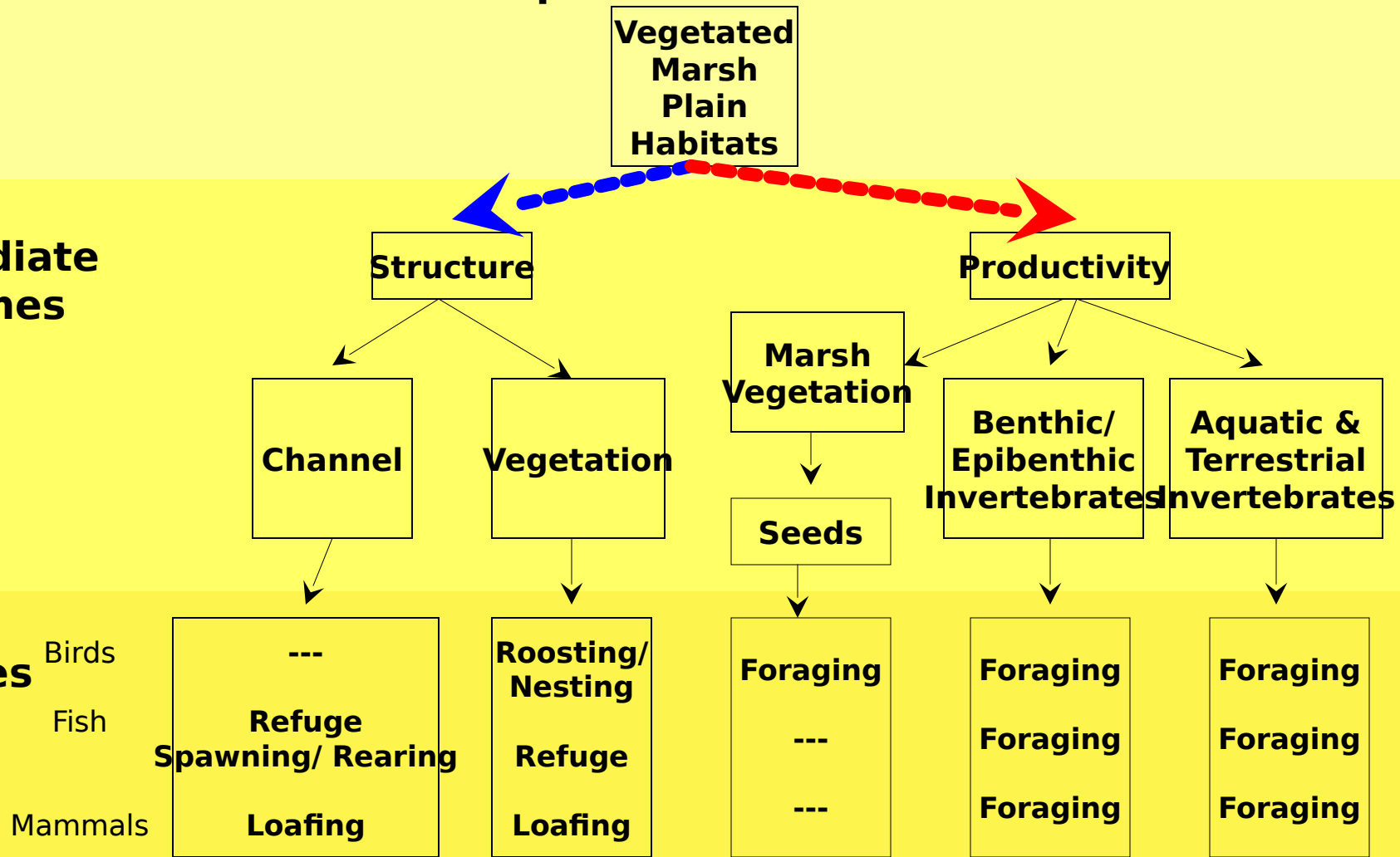
Low - dotted line

Model 3: Habitat Outputs

Drivers

Intermediate Outcomes

Outcomes



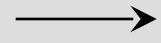
Importance:



High - thick line

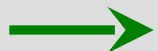


Med - medium line



Low - thin line

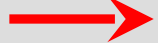
Understanding:



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Predictability:



High – solid line

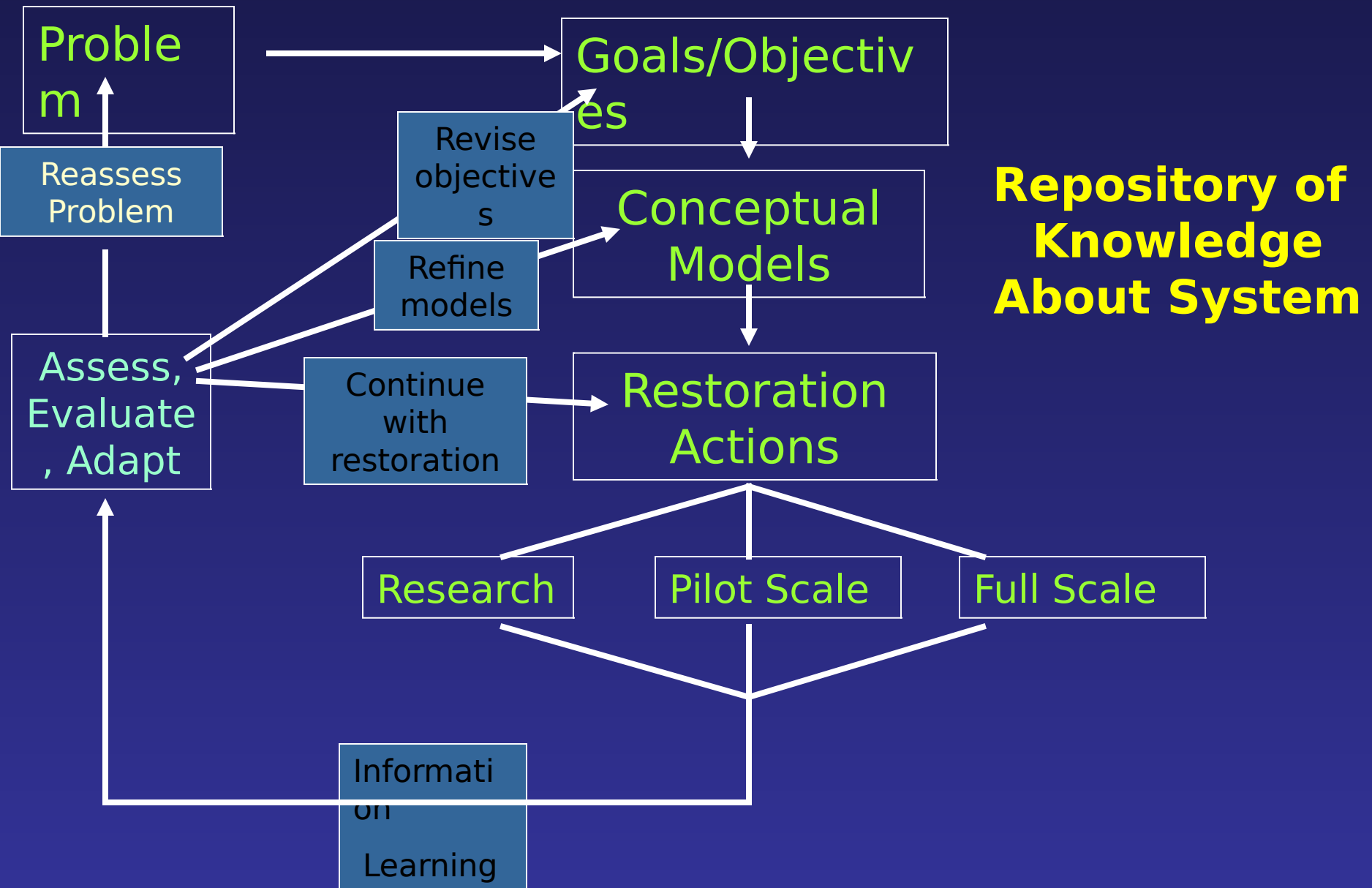


Med - dashed line



Low - dotted line

CALFED Strategic Plan Adaptive Management



Why is this so Difficult for USACE?

- **Drivers**

- Physical
- Biological
- Anthropogenic

- **Linkages (cause & effect)**

- Nature & direction
- Importance

- **Certainty**

- **Outcomes**

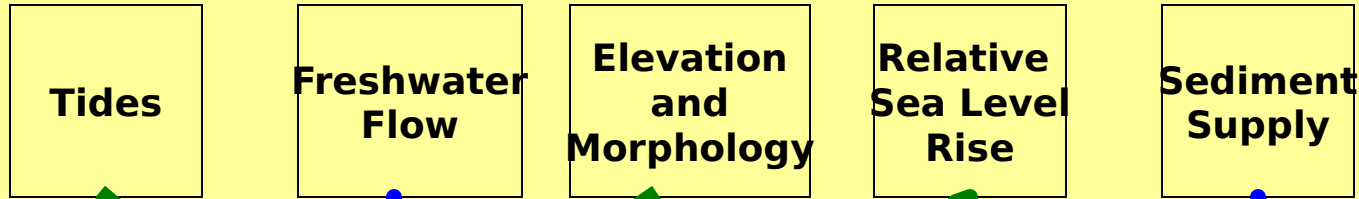
- Physical
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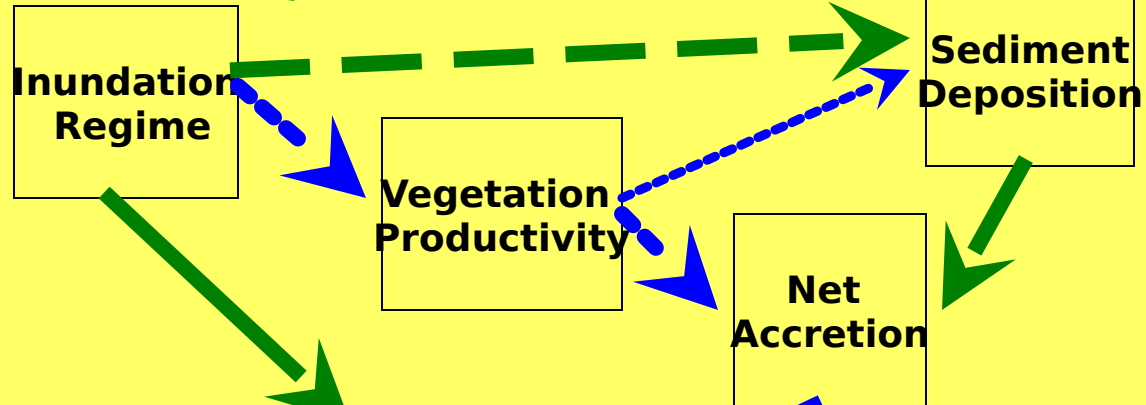
- Certainty = Predictability
- Certainty constrained by:
 - Imperfect Knowledge, especially in ecosystem context
 - System Variability, at local, regional and global scales
- Understanding $\neq$ Predictability

Model 1: Initiating Controls

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Intermediate Outcomes



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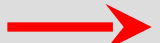
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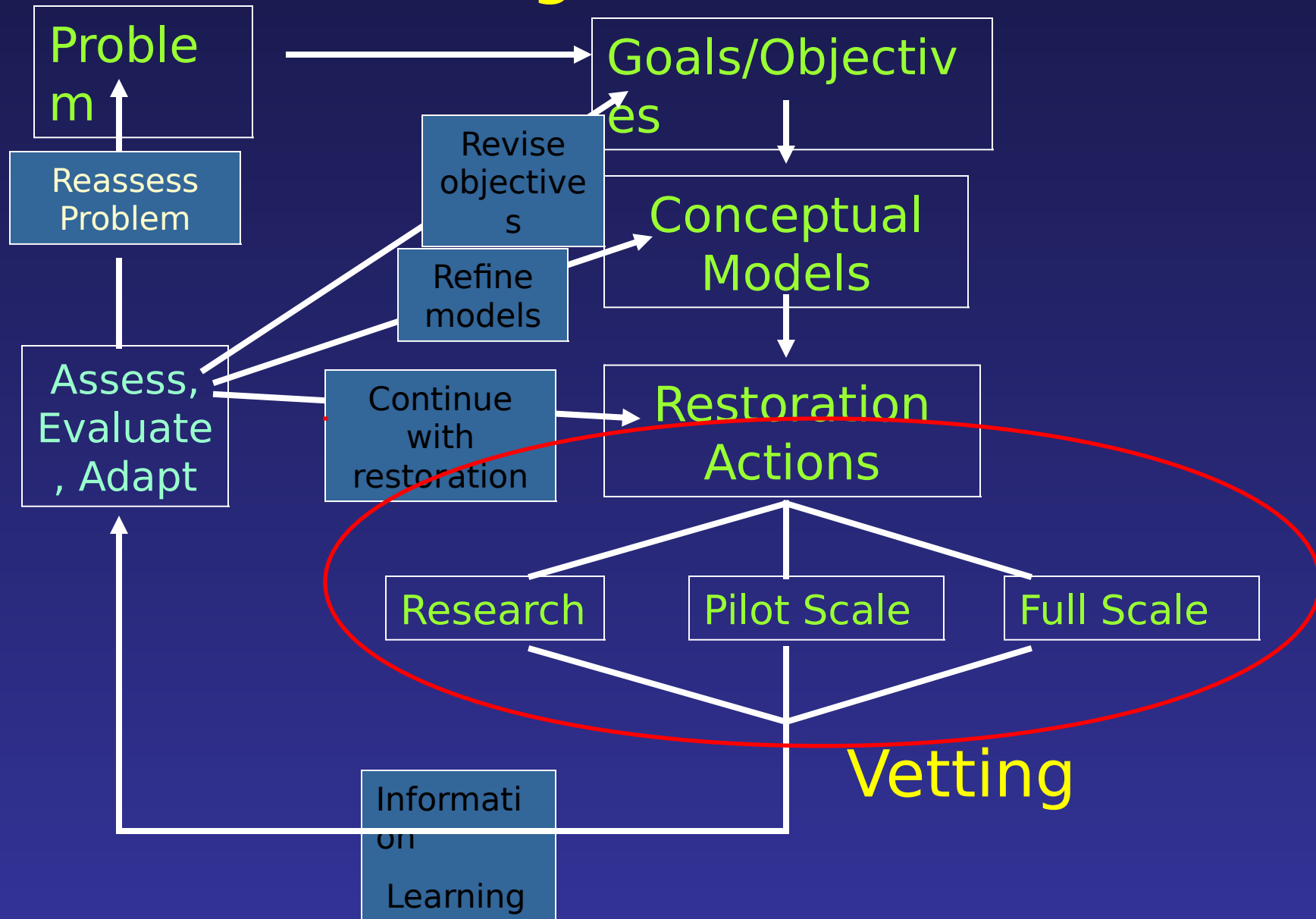


Low - dotted line

Where Next?

- Demonstration or Pilot projects to increase certainty (e.g., LCA)
- CMs that embrace and articulate uncertainty?
- Probabilistic approach to evaluation?
- Analytical tools that allow scenario analysis?

Strategic Plan Adaptive Management



Vetting Criteria

Linking Actions with Outcomes

Consider

- **Positive** ecological outcomes
(Worth) - magnitude ***and*** certainty
- **Negative** ecological outcomes
(Risk) - magnitude ***and*** certainty
- **Reversibility** of the action
- **Opportunity for learning**

Are we ready to proceed?

AMPT's preferred
modified Version 1

